Acute Appendicitis

EUGENE C. WEINSTEIN, M.D., *Granada Hills*

■ *Acute appendicitis still is a cause of considerable morbidity and now and then of death. The diagnostic accuracy in 316 patients operated on for acute appendicitis at Holy Cross Hospital was 76 per cent. In 24 of 239 cases of proved acute appendicitis, perforation had occurred, and the morbidity in those cases was three times that in the cases without perforation. Review of the cases did not reveal any clear-cut diagnostic criteria that might be used to predict perforation.*

A study of 30 patients with mesenteric lymphadenitis who were inadvertently operated on in the belief they had appendicitis, revealed that this condition is most likely to occur in young females with only a slight increase in the number of leukocytes. Although positive diagnosis of acute appendicitis is a difficult problem, the morbidity associated with needless operation is so much less than that which occurs in acute perforated appendicitis, that prompt exploration in any questionable case seems warranted.

TO CAST LIGHT on the still difficult problem of distinguishing acute appendicitis from other abdominal conditions that cause many of the same symptoms but do not necessitate operation, the records of patients with a diagnosis of acute appendicitis seen at Holy Cross Hospital, San Fernando, in a period of two and a half years were reviewed. A community hospital situated adjacent to Los Angeles, Holy Cross is staffed by both general practitioners and surgical specialists.

All the records of cases in which a diagnosis of acute appendicitis was made, including cases of wrong diagnosis, were scanned. In the period of two and a half years, 316 patients were operated on with a diagnosis of acute appendicitis, and in 239 of them (76 per cent) the diagnosis was confirmed by pathologic examination.

Submitted August 24, 1964.

The average age of the 239 patients with acute appendicitis was 22 years (range 4 to 87 years) and the ratio of males to females was 1.85 to 1.

The symptoms of abdominal pain, nausea and vomiting, as well as the physical findings of abdominal pain with or without rebound tenderness, were present in nearly all cases in which a clinical diagnosis of acute appendicitis was made. Fever and a history of recent upper respiratory tract infection were so infrequent that they were of no diagnostic value.

The average leukocyte count was 14,300 cells per cu mm (range, 5,100 to 27,500) while the duration of stay in hospital averaged four days (range 1 to 58). Antibiotics were used in 24 per cent of the cases, tetracycline most often. In many cases broad spectrum and anti-coccal antibiotics were used in combination. There were 33 postoperative complications in 24 cases (Table 1).

Perforation had occurred by the time of operation in 24 of the 239 cases of acute appendicitis. Data on the group with perforation were as follows: Age range 4 to 87 years with an average of 31. The ratio of males to females was 1.85 to 1. Leukocyte count averaged 14,100 cells per cu mm (range 7,100 to 26,300). Hospital stay averaged nine days (range 1 to 25). Antibiotics were used in 19 of the cases, combinations of them in most instances. Eight patients had 14 postoperative complications (Table 2).

Genital Tract Disorders

Ten female patients with disease of the reproductive tract were mistakenly operated upon for acute appendicitis. Three had acute salpingitis on the right side and seven had ruptured corpus luteum cysts of the right ovary. The age of the patients ranged from 13 to 36 years, averaging 23. The leukocyte count varied from 5,400 to 19,700 cells per cu mm and the average was 10,400. The duration of stay in hospital varied from 3 to 14 days, the average being 6 days. In one patient ileus developed postoperatively. An antibiotic, penicillin, was used in three of the cases postoperatively.

Mesenteric Lymphadenitis

Thirty patients operated upon for acute appendicitis were found at laparotomy to have mesenteric lymphadenitis. The age range of these patients was from 4 to 32 years and the average was 13 years. The ratio of males to females was 0.50 to 1. The leukocyte count averaged 12,600 cells per cu mm, varying from 5,600 to 32,100. Stay in hospital ranged from 2 to 6 days, averaging 3 days. Two patients had postoperative complications (hemophilus influenza meningitis, coryza). Antibiotics, all anticoccal in action, were used in four cases.

Normal Abdomen

In 34 cases in which abdominal exploration was carried out, no cause could be ascertained for the symptoms that had led to a diagnosis of appendicitis. The ages of the patients ranged from 5 to 51 years, averaging 35. The ratio of males to females was 0.36 to 1. Leukocytes numbered from 5,400 to 20,100 per cu mm (average, 9,700). Time in hospital averaged four days (range, 2 to 9 days). Postoperative complications developed in four cases—thrombophlebitis, pneumothorax, ileus and measles. Antibiotics were used in six of the cases, broad spectrum agents in three and anti-coccal varieties in three.

Miscellaneous

Three patients with inflammatory disease of the large intestine were mistakenly operated upon for acute appendicitis. One of them, a 46-year-old woman found to have cecal diverticulitis, was treated with demethylchlortetracycline (Declomycin®) and succinylsulfathiazole (Sulfasuxidine®) and left the hospital after seven days. A 36-year-old man with sigmoid diverticulitis and pelvic peritonitis who was treated postoperatively with oxytetracycline (Terramycin®) colistimethate (Colymycin®) and Sulfasuxidine® also was discharged after seven days in the hospital. The third patient, a 45-year-old man with sigmoid diverticulitis, left the hospital after three days without having had antibiotics after operation.

Discussion

Enough patients were operated on with a diagnosis of acute appendicitis in the period of two and a half years of this study to permit some conclusions to be drawn regarding the handling of cases of this type by the hospital staff.

The erroneous diagnosis rate of 24 per cent was only slightly higher than that reported from major medical centers.[1,2] In 4,500 cases at the Massachusetts General Hospital, there was an 18 per cent diagnostic error.[1] In the series reported by Boles, Ireton and Clatworthy,[2] the diagnostic error rate was 14 per cent in children 16 years of age and younger. The diagnosis was wrong in 42 per cent of 2,322 operations for acute appendicitis performed in a community hospital, as reported by Ross, Zarem and Morgan.[4]

The incidence of perforation in the present series was 10 per cent as compared with 18 per cent in

TABLE 1.—*Postoperative Complications Associated with Acute Appendicitis*

Complication	*Incidence*
Ileus	9
Wound infection	6
Pharyngitis, acute	7
Subphrenic abscess	2
Peritonitis	2
Pelvic abscess	1
Wound dehiscence	1
Atelectasis	1
Urinary retention	1
Fecal fistula	1
Diarrhea	1
Cystitis, acute	1

TABLE 2.—*Postoperative Complications Associated with Perforated Appendix*

Complication	*Incidence*
Ileus	4
Pharyngitis, acute	3
Wound infection	3
Peritonitis	1
Fecal fistula	1
Wound dehiscence	1
Pelvic abscess	1

the Massachusetts General Hospital series.[1] Mesenteric lymphadenitis was the cause of the symptoms in 9.5 per cent of the cases and in 10.8 per cent no abnormality was found at operation, compared with 4.6 and 2.8 per cent respectively in the Massachusetts General series.

Unfortunately nothing was observed that would help in distinguishing clinically between cases in which perforation had taken place and those in which it had not. Although acute non-perforated appendicitis is more common in males than females, while in perforated appendicitis the sex incidence is reversed, the difference is not great enough to be of help in "statistical diagnosis." The average age of patients with perforation was nine years greater than that of the overall group; however, perforation occurred in both the youngest and the oldest patients in the series.

In the present study there was no significant difference in leukocyte count between patients who had perforation and those who had not—a fact at variance with corresponding data in most reported series.

The average stay in hospital was more than twice as long for patients with perforation as for the group as a whole, a reflection of the difference in morbidity rates, 33 per cent and 10 per cent respectively. In the series reported by Boles and associates,[2] the morbidity rate was six times higher for those with perforation than in the non-perforated group, with a duration of hospital stay of 11.7 days in the perforated group as compared with 4.8 days in the non-perforated group.

In this series, antibiotics were given after operation in 24 per cent of the total group as compared with 78 per cent in the perforated group. With respect to the use of antibiotics in a high proportion of cases in which perforation had occurred, it is noteworthy that there were no deaths in the series.

As there are no diagnostic criteria to help in determining before operation whether perforation has occurred, then in light of the statement by Brown and coworkers[1] that patients with acute appendicitis are seen no earlier than they were 23 years ago, it appears that at present the only way to decrease perforation is to operate sooner after they do come to medical attention.

In the present series the average age, the physical symptoms and the leukocyte counts of women with disease of the reproductive organs who were mistakenly operated on in the belief that they had appendicitis, did not differ greatly from these factors in women who did have acute appendicitis. Guardet and Enquist[3] reviewed the cases of 27 women with acute pelvic inflammatory disease mistakenly operated on for acute appendicitis and could find no constant difference in clinical features sufficient to justify withholding operation in some cases.

Comparison of symptoms and other data on mesenteric lymphadenitis with similar factors as related to acute appendicitis may be somewhat more helpful. Patients with mesenteric lymphadenitis averaged nine years younger than those who had appendicitis and the age range was much narrower—4 to 32 years for one group against 4 to 87 years for the other. Whereas the male to female ratio in acute appendicitis was 1.85 to 1, in mesenteric lymphadenitis it was 0.50 to 1, and the average number of leukocytes was 12,600 per cu mm as compared with 14,300. Hence in young females with only minimally elevated leukocyte count, mesenteric lymphadenitis should be strongly considered in the differential diagnosis of acute pain in the right lower quadrant of the abdomen.

The average age of patients in whom no abdominal abnormality was found at laparotomy, was 13 years greater than that of patients with acute appendicitis, and in this group the ratio of male to female patients was 1:3. The average leukocyte count in such patients was within normal range although it varied from 5,400 to 20,100 cells per cu mm. Unfortunately the physical findings were the same as for patients who had acute appendicitis.

17050 Chatsworth Street, Granada Hills, California.

REFERENCES

1. Barnes, B. A., Behringer, G. E., Wheelock, F. C., and Wilkins, E. W.: Treatment of appendicitis at the Massachusetts General Hospital (1937-1959), J.A.M.A., 180:122, April, 1962.

2. Boles, E. T., Jr., Ireton, R. J., and Clatworthy, H. W., Jr.: Acute appendicitis in children, A.M.A. Arch. Surg., 79:447, Sept., 1959.

3. Guardet, R., and Enquist, L. F.: Differential diagnosis between appendicitis and acute pelvic inflammatory disease, Surg. Gynec. and Obstet., 116:212, Feb., 1963.

4. Ross, F. P., Zarem, H. A., and Morgan, A. P.: Appendicitis in a community hospital; a decreasing but still dangerous disease, A.M.A. Arch. Surg., 85:1036, Dec., 1962.